

REMARKS

This amendment responds to the February 15, 2006 Office Action. With this Amendment, Applicants have amended claims 14-20. Thus, upon entry of the present amendments, claims 14-20 will be pending in the above-identified application. No new matter has been added by way of the amendments to the claims.

In the February 15, 2006 Office Action, the Examiner

- rejected claims 14-20 under 35 U.S.C. § 101 because the claims are allegedly drawn to non-statutory subject matter;
- objected to claims 15, 18, and 19 under 37 C.F.R. § 1.75(c) as being of improper dependent form for allegedly failing to further limit the subject matter of a previous claim;
- rejected claims 14-17 under 35 U.S.C. § 103(a) as being unpatentable over Weinberg *et al.* (US 20020116417 A1); and
- rejected claim 20 under 35 U.S.C. § 103(a) as being unpatentable over Weinberg *et al.* (US 20020116417 A1) in view of Marca (US 5,050,074 A).

THE 35 U.S.C. § 101 REJECTION OF CLAIMS 14-20 SHOULD BE WITHDRAWN

Applicants have amended the claims so that they are now directed to a computer system. Accordingly, Applicants request that the 35 U.S.C. § 101 rejection be withdrawn.

THE OBJECTION OF CLAIMS 15, 18, AND 19 SHOULD BE WITHDRAWN

Claim 15. The Examiner objects to claim 15 on the basis that this claim is improper for allegedly failing to further limit the subject matter of a previous claim. The Examiner notes that claim 15, which recites the clause “wherein the orientation is horizontal or vertical,” seeks to limit a “when” clause in parent claim 14. The Examiner cites Manual for Patent Examining Procedure (hereinafter “M.P.E.P.”) § 2111.04 for the proposition that a claim is not limited by claim language that suggests or makes optional but does not require steps to be performed. In essence, the

Examiner argues that the “when” clause of claim 14 does not limit claim 14. Applicants respectfully disagree.

Applicants have used a “when” clause in the recitation of Applicants’ type field in claim 14. Applicants’ type field specifies whether a respective split is a data split. When the respective split is not a data split, the type field defines an orientation of the respective split within the parent split of the respective split. This type field is described on page 10, lines 15-17, of Applicants’ specification as follows:

The type column in layoutdata table 84 determines whether a given split is directional with respect to the parent split (e.g., horizontal or vertical) or if the split is a data split.

Importantly, as recited in claim 14, the type field requires all splits that are not data splits to be a split *within* the parent split. This requirement gives rise to layouts such as the full HTML layout illustrated in Applicants’ Figure 4T. Furthermore, it is clear that at least one split in any layout recited by claim 14 defines an orientation of a split within a parent split. Otherwise, if all splits in the claimed layout were simply data splits, there would be no hierarchy of splits in the claimed layout. But, this cannot be. Claim 14 is directed to a layout comprising a *hierarchy* of splits. Thus, at least one split stored in the layoutdata table must define an orientation of the respective split within the parent split. Page 21, line 29, through page 22, line 2, of the specification provides an illustration of a data split:

FIG. 4H shows the user selecting a dropdown option from menu 430 of split 428 in order to add a data split into split 428. The insertion of a data split is referenced by the menu option "insert object" in menu 430. Selection of the "insert object" menu option results in the creation of a row in layoutdata table 84 to record the data split in the same manner that the other splits were recorded in table 84 with one exception. The "type" field in table 84 for the newly created data split is assigned the type value of "D" for data. A type designation of "D" means that only an object can be contained inside the split, and additional splits cannot be inserted inside the split.

From this discussion, it is clear that the type field recited in claim 14 is an important aspect of Applicants’ invention and therefore the “when” clause in claim 14 limits the scope of the claim.

Section 2111.04 of the M.P.E.P. provides the following specific examples of claim language that may raise a question as to limiting effect of a claim: “adapted to” or “adapted for” clauses, “wherein” clauses and “whereby” clauses. There is no mention of “when” clauses in M.P.E.P. § 2111.04.

M.P.E.P. § 2111.04 does note that in *Hoffer v. Microsoft Corp.*, 405 F.3d 1326, 1329 (Fed. Cir. 2005), (attached hereto as Exhibit A) the court held that when a “whereby” clause states a condition that is material to patentability, it cannot be ignored in order to change the substance of the invention.” In determining that the transitional “wherein” phrase did indeed limit a claim at dispute in *Hoffer*, the Court noted that disregarding the limitations of the wherein clause would be contrary to the fundamental invention. Likewise, in Applicants’ claims, any interpretation of claim 14 in which the claim was not limited by the “when” clause would be contrary to Applicants’ fundamental invention. Applicants have invented, *inter alia*, a type field that specifies that a given split is either (i) a data split or (ii) not a data split. Furthermore, when the split is not a data split, the type field further specifies the orientation of the respective split within a parent split. As discussed above, at least one split must not be a data split. Otherwise, the claimed hierarchy of splits would not be achieved. Applicants’ inventive feature is illustrated, for example, by data structure 84 of Fig. 2, and by page 15, lines 15-17, of Applicants’ specification: “[t]he type column of layoutdata table 84 determines whether a given split is directional with respect to the parent split (e.g., horizontal or vertical) or if the split is a data split.” Thus, contrary to the Examiner’s assertions, Applicants respectfully submit that the “when” clause in Applicants’ claim 14 does limit the claim, consistent with *Hoffer*, and therefore the Examiner’s objection to claim 15 is unfounded. Applicants respectfully request that the objection to claim 15 be withdrawn.

Claims 18 and 19. The Examiner reasons that claims 18 and 19 do not fully further limit claim 17 since claims 18 and 19 each limit a Markush group in claim 17 to a single element. The Examiner reasons that it is only necessary to follow one path set forth in the claim and that the paths limited by claims 18 and 19 may or may not be followed. As such, the Examiner reasons, claims 18 and 19 do not fully further limit the claim from which they depend. The Examiner’s reasoning is in contradiction to well established patent claim drafting principles as well as case law on this point. Therefore, Applicants respectfully disagree with the objection to claims 18 and 19.

Section 2173.05(h) of the M.P.E.P. states that the “use of Markush claims of diminishing scope should not, in itself, be considered sufficient basis for objection to or rejection of claims.” This exact practice was followed in claim 4 of United States patent number 4,916,243 (hereinafter “the ‘243 patent,” attached hereto as Exhibit B). Claim 4 of the ‘243 patent recites “wherein said alkali metal is lithium” thereby limiting the Markush group of claim 1, “alkali metal selected from the group consisting of lithium, sodium, potassium and rubidium,” to lithium. In *Union Carbide Chems. & Plastics Tech. Corp. v. Shell Oil Co.* 425 F.3d 1366 (Federal Circuit, 2005) at 1371, attached hereto as Exhibit C, the Federal Circuit noted that the district court had interpreted claim 4 to limit the Markush group of claim 1 to lithium.¹ The Federal Circuit did not overturn the district courts’ interpretation of claim 4. Thus, as in the case of claim 4 of the ‘243 patent as interpreted in *Union Carbide*, claims 18 and 19 do in fact limit the claim from which they depend. Applicants respectfully request that the objection to claims 18 and 19 be withdrawn and that the claims be considered on their merits in view of *Union Carbide* in which a dependent claim further limiting a Markush group was not found to be of improper dependent form.

THE 35 U.S.C. § 103 REJECTION OF CLAIMS 14-17 SHOULD BE WITHDRAWN

The Examiner has rejected claims 14-17 under 35 U.S.C. § 103(a) as being unpatentable over Weinberg *et al.* (US 20020116417 A1). Applicants traverse the rejection. Weinberg does not teach or suggest each and every claim limitation of Applicants’ invention. For example, there is no type field in Weinberg that specifies whether the respective split is a data split and, when the respective split is not a data split, defines an orientation of the respective split within the parent split of the respective split. In arguing that Applicants’ type field is obvious in view of Weinberg, the Examiner relies on the definition of a “field” as set forth in Weinberg rather than the plain language of Applicants’ claim 14. The fact that Weinberg defines a field as one of the data elements of a record and is common to all the records in a table has no meaning or significance to Applicants’ claimed invention. Nor does it render Applicants’ invention obvious. Claim 15 is directed to splits that define a

¹ The Federal circuit notes that the district court construed the catalyst of claim 4 to comprise silver, cesium, and lithium, where lithium is from the Markush group of claim 1 (group consisting of lithium, sodium, potassium, and rubidium).

vertical or horizontal orientation of a split within a parent split. Weinberg does not teach or suggest this claim limitation.

Nor does Weinberg teach or suggest the claim limitations of claims 16 and 17. There is nothing comparable to a views table in Weinberg. Claim 16 recites a views table for storing a different view for each data split in a split hierarchy, where each of the different views references an object. In other words, the views table contains instruction for how data will appear in a corresponding split. View tables are explained, *inter alia*, on page 12, lines 16-25 of Applicants' specification:

Each row of view table 88 has an object field that identifies the object to which the view applies. Further, each view has a view identifier that is stored in the view_id column of view table 88. There is a one to one correspondence between the view identifier of a view and the split identifier of the corresponding split that holds the object regulated by a particular view. In other words the view_id of views table 88 is exactly equal to the split_id of the data split in layoutdata table 84 that contains this view. When an object is added to a split in a layout, **a view is created in order to regulate how the object appears in the split.** Each view has a user class field, which is stored in the user_class field of view table 88, that identifies the user class that has full access to the view. (*emphasis added*)

The Examiner equates Applicants' claim 16 with paragraph 77 of Weinberg. However, paragraph 77 of Weinberg, in fact, *teaches away* from Applicants' claim 16. Applicants' claim 16 recites a different view for *each data split* in the split hierarchy. In complete contrast, paragraph 77 of Weinberg teaches, rather than providing view data for each record, providing a formatted family layout that uniformly applies to a family of records. Moreover, application of Weinberg's presentation to Applicant's split hierarchy would render Applicants' invention inoperable. Each data split in Applicants' split hierarchy has a corresponding view in the views table. There is not a uniform or master "presentation" that applies to an entire family as taught in Weinberg. Claims 17-19 depend from claim 16 and are patentable over Weinberg for at least the same reasons that claims 14 and 16 are patentable over Weinberg. Accordingly, Applicants request that the rejection of claims 14-17 under 35 U.S.C. § 103(a) be withdrawn.

THE 35 U.S.C. § 103 REJECTION OF CLAIM 20 SHOULD BE WITHDRAWN

The Examiner has rejected claim 20 under 35 U.S.C. § 103(a) as being unpatentable over Weinberg *et al.* (US 20020116417 A1) in view of Marca (USP 5,050,074). Applicants traverse the rejection.

When rejecting claims under 35 U.S.C. § 103, the Examiner bears the burden of establishing a *prima facie* case of obviousness. *In re Bell*, 26 USPQ2d 1529 (Fed. Cir. 1993). To establish a *prima facie* case, the prior art reference, or references when combined, must teach or suggest each and every limitation of the claimed invention. M.P.E.P. § 706.02(j). The teaching or suggestion to make the claimed invention and the reasonable expectation of success must both be found in the prior art, not in the applicant's disclosure. *In re Vaeck*, 20 USPQ2d 1438 (Fed. Cir. 1991). There must be some motivation, suggestion, or teaching of the desirability of making the specific combination that was made by the Applicant. *In re Fine*, 837 F.2d 1071, 1075 (Fed. Cir. 1988).

First, as discussed above, Weinberg fails to teach or suggest each and every claim limitation of Applicants' claim 14. Claim 20 depends from claim 14 and is patentable over Weinberg for at least the same reasons that claim 14 is patentable over Weinberg. Marca fails to remedy the deficiencies in Weinberg. For example, Weinberg does not teach or suggest Applicants' type field as recited in claim 14.

Second, there is no suggestion in the prior art to combine Marca with Weinberg. Marca is a system for facilitating the coordination of activities of actors. Weinberg is a system for displaying tabular data. The two references having nothing in common with each other except, at most, the use of a database to store information. Application of Weinberg to Marca would provide no improvement to Marca. Conversely, application of Marca to Weinberg would provide no improvement to Weinberg. Thus, the Examiner has failed to establish a *prima facie* case of obviousness.

Third, even if Weinberg and Marca could fairly be combined, which they cannot, the combination does not teach or suggest the limitations of claim 20. Marca is directed to coordinating human activity. In complete contrast, the actions table recited in Applicants' claim 20 comprises each operation on a layout that is performed by a user. As noted on page 9, lines 1-5 of Applicants' specification:

Actions table 72 stores user invoked operations that create or edit layouts, splits, object views, or objects as actions. The operation column of action table 72 indicates the type of action the user has taken. The target column of action table 72 indicates the layout (layout_id), split (split_id), object view (view_id), or object (object_id) that the action is being committed upon.

Thus, Applicants' action table records operations performed on a layout by a user. Marca does not teach or suggest storing operations performed on a layout by a user. As such, the combination of Weinberg and Marca does not render Applicants' claim 20 obvious.

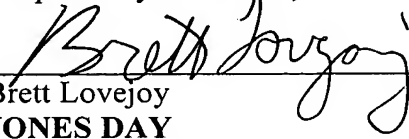
Accordingly, for at least the three cited reasons, Applicants request that the rejection of claim 20 under 35 U.S.C. § 103(a) be withdrawn.

CONCLUSION

No fee is believed owed in connection with the filing of this response. However, should the Commissioner determine otherwise, the Commissioner is authorized to charge any underpayment or credit any overpayment to Jones Day Deposit Account No. 16-1150 for the appropriate amount. A copy of this sheet is attached.

Date: March 21, 2006

Respectfully submitted,


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405 F.3d 1326, *, 2005 U.S. App. LEXIS 6965, **;
74 U.S.P.Q.2D (BNA) 1481

LEXSEE 405 F.3D 1326

**STEVEN M. HOFFER, Plaintiff-Appellant, v. MICROSOFT CORPORATION,
Defendant-Appellee, and INTERNATIONAL BUSINESS MACHINES
CORPORATION, Defendant-Appellee, and Ariba INCORPORATED, Defen-
dant-Appellee.**

04-1103

UNITED STATES COURT OF APPEALS FOR THE FEDERAL CIRCUIT

405 F.3d 1326; 2005 U.S. App. LEXIS 6965; 74 U.S.P.Q.2D (BNA) 1481

April 22, 2005, Decided

SUBSEQUENT HISTORY: Rehearing denied by, Rehearing, en banc, denied by *Hoffer v. Microsoft Corp.*, 2005 U.S. App. LEXIS 12436 (Fed. Cir., May 31, 2005)

US Supreme Court certiorari denied by *Hoffer v. Microsoft Corp.*, 2006 U.S. LEXIS 232 (U.S., Jan. 9, 2006)

PRIOR HISTORY: [**1] Appealed from: United States District Court for the Northern District of California. Judge James Ware. *Hoffer v. Microsoft Corp.*, 2003 U.S. Dist. LEXIS 26729 (N.D. Cal., Nov. 24, 2003)

DISPOSITION: AFFIRMED IN PART, REVERSED IN PART.

COUNSEL: Steven M. Hoffer, of San Diego, California, Pro se.

I. Neel Chatterjee, Orrick Herrington & Sutcliffe, LLP, of Menlo Park, California, for defendant-appellee Microsoft Corporation. On the brief was Joseph T. Jakubek, Klarquist Sparkman, LLP, of Portland, Oregon. Of counsel was Isabella Fu, Microsoft Corporation, of Redmond, Washington.

Charles K. Verhoeven, Quinn Emanuel Urquhart Oliver & Hedges, LLP, of San Francisco, California, for defendant-appellee International Business Machines Corporation. With him on the brief were Robert W. Stone and W. Paul Schuck.

Neil A. Smith, Howard, Rice, Nemerovski, Canady Falk & Rabkin, P.C., of San Francisco, California, for defendant-appellee Ariba, Incorporated.

JUDGES: Before NEWMAN, BRYSON, and DYK, Circuit Judges. Opinion for the court filed PER CURIAM. Opinion concurring in the judgment filed by Circuit Judge NEWMAN.

OPINION: [*1328] PER CURIAM.

Steven M. Hoffer appeals the summary judgment of the United States District Court for the Northern District of California, n1 holding that defendants [**2] Microsoft Corporation, International Business Machines Corporation, and Ariba Incorporated do not infringe claim 21 of United States Patent No. 5,799,151 (the '151 patent) and that claim 22 of said patent is invalid for indefiniteness. We reverse the judgment of invalidity on the ground of indefiniteness, affirm the claim construction of the "whereby" clause, do not reach the remainder of the claim construction, and affirm the judgment of non-infringement.

n1 *Hoffer v. Microsoft Corp.*, 2003 U.S. Dist. LEXIS 26729, No. 01-CV-20731 JW (N.D. Ca. Nov. 24, 2003).

Standards of Review

Summary judgment is proper when there is no genuine issue as to any material fact and the moving party is entitled to judgment as a matter of law. *Fed. R. Civ. P. 56(c)*; *Anderson v. Liberty Lobby, Inc.*, 477 U.S. 242, 248, 91 L. Ed. 2d 202, 106 S. Ct. 2505 (1986). Plenary review is given to the grant of summary judgment, to determine whether the law was correctly understood and correctly applied. See, e.g., *Monarch Knitting Mach. Corp. v. Sulzer Morat GmbH*, 139 F.3d 877, 880 (Fed. Cir. 1998). Summary judgment may properly be granted on [**3] questions of fact when no reasonable jury could reach a contrary verdict, even after drawing all reasonable factual inferences in favor of the non-movant. See, e.g., *Vivid Technologies, Inc. v. Am. Science & Eng'g, Inc.*, 200 F.3d 795, 806 (Fed. Cir. 1999).

Issues of the meaning and scope of patent claims are reviewed for correctness, as a matter of law. *Markman v. Westview Instruments Corp.*, 517 U.S.

370, 372, 134 L. Ed. 2d 577, 116 S. Ct. 1384 (1996). Invalidity for claim indefiniteness is also deemed to be a matter of law and receives plenary review. See *Allen Eng'g Corp. v. Bartell Indus. Inc.*, 299 F.3d 1336, 1344 (Fed. Cir. 2002). The denial of discovery under Fed. R. Civ. P. 56(f) is reviewed for abuse of discretion, applying the procedural law and discovery rules of the regional circuit, here the Ninth Circuit. See *United States v. Kitsap Physicians Serv.*, 314 F.3d 995, 1000 (9th Cir. 2002); *Vivid Technologies*, 200 F.3d at 807. A court is deemed to have abused its discretion when it has made an error in law, a clear error of fact, or a clear error of judgment [**4] in weighing the relevant factors. See *Monsanto Co. v. McFarling*, 302 F.3d 1291, 1296 (Fed. Cir. 2002).

The Patented Invention

The '151 patent, entitled "Interactive Electronic Trade Network and User Interface," is directed to an apparatus and method by which remote users of computer terminals obtain data concerning economic activity from an index, and interactively post and receive messages concerning economic topics. The '151 patent [*1329] specification describes the invention as "providing intercomputer communication for implementing collaborative messaging between two or more users that desire to read or exchange messages on any indexed topic of economic activity" Column 6, lines 60-63.

Claims 21 and 22 are at issue. Claim 21 follows, showing in bold typeface the terms whose construction was in dispute:

21. A method of **messaging** among at least two **remote user terminals** ("RUTs") in addition to a **host computer** ("Host") that uses communication software and hardware to connect to a communication network that supports asynchronous transport mode and serial data transmission, said Host serving as a central messaging information [**5] center that provides a **plurality of RUTs** with data in an integrated application program interface ("IAP") that coordinates the operation for said Host's other sub-systems that comprise a programmable application ("PA") supporting IAP menu functions, system commands, and store-and-forward messaging, an index system reflecting at least one published index that divides broad economic activity into mutually exclusive numbered topics that are used routinely in public and private sectors, a **memory** configured to correspond to said index system using an operating system, said PA's configuration editor

for storage, and PA files, and said method comprises the steps of:

storing in said Host's memory, file capacity calibrated to each subdivision of said index system;

modifying said Host's memory, using said PA to store in a complete series those **topic boards** identified by multiple-digit numbers that match all multiple-digit numbers in said index system;

storing inside said IAPI sufficient logical progressions of menus with commands for a user at any of said plurality of RUTs to select from said topic boards and enter a topic board matching an index number therein [**6] by entering input associated with said index number;

and establishing communications over said network between said Host and said plurality of RUTs to enable said PA to control said Host's processing of said RUTs's commands, and transmit over multiple lines messages and data on a selected topic board;

whereby a trade network supports users at said plurality of RUTs who are each guided by said IAPI to select an economic activity, to identify that index topic that corresponds to said activity, to enter that topic board dedicated to said topic, and who are collectively able to concurrently engage in **interactive data messaging** on said topic boards.

Mr. Hoffer challenges the district court's construction and definition of several claim terms. We review only the construction of the "whereby" clause, for the "interactive" limitation therein suffices to support the district court's finding of noninfringement.

The "Whereby" Clause

Mr. Hoffer states that the district court erred in holding that the "whereby" clause limits the claims, pointing out that the Federal Circuit has held that "a whereby clause in a method claim is not given weight when it simply expresses [**7] the intended result of a process step positively recited." *Minton v. NASD*, 336 F.3d 1373, 1381 (Fed. Cir. 2003). It is correct that a "whereby" clause generally states the result of the patented process. However, when the "whereby" clause states a condition that is material to patentability, it cannot be ignored in order to change the substance of the invention.

[*1330] Mr. Hoffer proposes that with elimination of the "whereby" clause, claim 21 would not require that the network have the capability of interactive data messaging among users of the system. He explains that collaborative messaging between two or more users may indeed be implemented by adaptation of known sub-systems to his multimode messaging and conferencing on indexed topics of trade, but that interactive messaging is not required by his invention. He argues that since the whereby clause does not state the mechanics of how to update topic board files or store menu files for navigation, or show what enables host programmable applications to transmit to network services, the whereby clause simply describes the overall objective but does not limit the claim to interactive data [**8] messaging.

The district court held that such a construction would be contrary to the fundamental invention, which the specification describes as interactive data messaging. The whereby clause describes a network of users at multiple remote user terminals who are "collectively able to concurrently engage in interactive data messaging." This capability is more than the intended result of a process step; it is part of the process itself. This interactive element is described in the specification and prosecution history as an integral part of the invention. The "Summary of the Invention" recites that "from a remote terminal, the user would enter selected topic boards on a Host Terminal System ('Host System') to address messages to, and receive messages from, other intended users." Col. 6, lines 64-67. Thus, the users communicate with each other. The prosecution history is in accord. Mr. Hoffer points to an amendment during prosecution which made the disclaimer that "newly added [patent claim 21] is an independent method claim . . . that satisfies the Examiner's Statement by solely teaching methods distinct from real-time messaging." Amendment, September 29, 1997. However, there is a difference [**9] between real-time messaging and interactive messaging, which can occur in real time or asynchronously.

We confirm the district court's construction of the "whereby" clause as requiring interactive data messaging, and that claim 21 is thereby limited to a method that provides interactive data messaging.

Data Messaging

Mr. Hoffer accepts that if the "whereby" clause is viewed as a claim limitation, literal infringement cannot lie because the accused method, called the Universal Description Discovery and Integration system (UDDI), does not permit interactive data messaging. He then proposes infringement under the doctrine of equivalents. The district court granted summary judgment of non-infringement under the doctrine of equivalents, applying the "all-elements rule" as set forth in *Warner-Jenkinson Co. v. Hilton Davis Chem. Co.*, 520 U.S. 17, 40, 137 L. Ed. 2d 146, 117 S. Ct. 1040 (1997).

The court held that a system whereby information can only be posted, as in the accused system, cannot be equivalent to a system where the users can also communicate with each other. We agree that this interactive capability is a material element of the claimed invention, and that no [**10] equivalent thereof exists in the UDDI. Thus the judgment of noninfringement under the doctrine of equivalents is affirmed.

Other Claim Terms

Because the construction of the whereby clause is sufficient to sustain the district court's finding of non-infringement, we do not review the court's construction of the other disputed claim terms.

Validity of Claim 22

[*1331] Claim 22 as written was dependent from claim 38. The district court held claim 22 invalid for "indefiniteness" because there is no claim 38 in the issued patent:

22. A method in accordance with claim 38, wherein said index system is at least:

one indexed [sic] of classes of goods and one index of classes of industrial establishments

This error in dependency of claim 22 is apparent on the face of the printed patent, and the correct antecedent claim is apparent from the prosecution history. The patent application as filed and as prosecuted contained independent claim 38 and dependent claim 39. During prosecution both claim 38 and claim 39 were allowed, but some earlier claims were cancelled. In preparation for printing, the examiner renumbered claim 38 as claim 21, and renumbered [**11] claim 39 as claim 22. However, the examiner did not make the corresponding change in the text of claim 22. Thus although claim 39 was renumbered as claim 22, the internal reference to claim 38 was not changed. The district court found that the PTO was responsible for the error. Mr. Hoffer obtained a certificate of correction in accordance with 35 U.S.C. § 254 after this action was filed, changing the antecedent claim "38" to "21." The district court declined to accept the correction, deeming it tardily made.

The district court stated that it was powerless to correct the error. We do not agree that such correction exceeds the judicial power. Absent evidence of culpability or intent to deceive by delaying formal correction, a patent should not be invalidated based on an obvious administrative error. The defendants did not state that they were prejudiced, or even confused, by the error. The district court held that it has no authority

to correct or ignore even a typographical error in a patent. That is inaccurate. When a harmless error in a patent is not subject to reasonable debate, it can be corrected by the court, as for other legal documents. See *Novo Indus., L.P. v. Micro Molds Corp.*, 350 F.3d 1348, 1356-57 (Fed. Cir. 2003). **[**12]** Here the error was apparent from the face of the patent, and that view is not contradicted by the prosecution history. We conclude that claim 22 was improperly invalidated.

However, claim 22, which is more limited in scope than claim 21 from which it depends, cannot be infringed when the broader claim 21 is not infringed. *Wahpeton Canvas Co., Inc. v. Frontier, Inc.*, 870 F.2d 1546, 1553 (Fed. Cir. 1989). Thus although we reverse the holding of invalidity of claim 22, claim 22 is not infringed by the UDDI systems.

Discovery

Mr. Hoffer appeals the denial of his request for discovery under *Fed. R. Civ. P. 56(f)*, which he states was needed in order to respond to the defendants' motions for summary judgment. He states that although the district court relied on various witnesses' evidence to resolve disputed facts material to infringement, he was denied the opportunity to take the depositions of those witnesses and to learn how the accused instrumentalities really operate. Mr. Hoffer states that details on the data storage and data process tiers of the accused product were in the exclusive control of the defendants **[**13]** and not otherwise knowable.

The district court ruled that the requested discovery could not avert the decision of non-infringement. The defendants point out that it was undisputed that the UDDI system does not allow users to communicate interactively with each other by posting messages. The district court concluded that this undisputed fact warranted the grant of summary judgment, and that the **[*1332]** requested details on data storage were not relevant to this fundamental claim limitation, and could not change the result. We agree. See *Nidds v. Schindler Elevator Corp.*, 113 F.3d 912, 921 (9th Cir. 1996) (the party seeking discovery must show that the evidence sought could preclude the grant of summary judgment); *United States for Use and Benefit of Hawaiian Rock Prods. Corp. v. A.E. Lopez Enters., Ltd.*, 74 F.3d 972, 975 (9th Cir. 1996) (same). The district court did not abuse its discretion in denying the *Rule 56(f)* motion for additional discovery.

Other Claims

Mr. Hoffer states that the district court improperly invalidated all of the patent claims, including claims not at issue or not yet litigated. The district court entered final judgment **[**14]** in favor of the defendants "on all of the claims, as well as the counterclaims for declaratory judgment of non-infringement and invalidity." From its context, this statement clearly refers to

the "claims" of the pleadings, not the "claims" of the '151 patent. The only patent claims placed at issue were claims 21 and 22; the district court opinion does not discuss any other patent claims, and no other patent claims were adjudicated.

Conclusion

We affirm that claims 21 and 22 are not infringed. The invalidation of claim 22 for indefiniteness is reversed.

Each party shall bear its costs.

AFFIRMED IN PART, REVERSED IN PART

CONCURBY: NEWMAN

CONCUR: NEWMAN, Circuit Judge, concurring in the judgment.

I agree with the court's judgment as to both infringement and validity. I write separately to express my concern at the court's decision not to review the entirety of the appealed claim construction, my colleagues on the panel declining to review any appealed aspect of the district court's construction other than whether the "whereby" clause limits the claim. Supreme Court precedent and practical appellate obligation require our review of the appealed subject matter when that **[**15]** subject matter may be relevant to further review or other proceedings involving the patent. The claim construction was fully litigated and fully decided by the district court, and several aspects thereof are challenged on this appeal. All of the disputed aspects of the district court's claim construction were fully briefed and fully argued; they warrant appellate resolution, not appellate silence.

The Supreme Court has explained that it is inappropriate for the Federal Circuit to decline appellate review of patent issues that were decided by the district court, when these issues may arise on further appeal to the Court or in other litigation of the same patent. In *Cardinal Chemical Co. v. Morton International, Inc.*, 508 U.S. 83, 124 L. Ed. 2d 1, 113 S. Ct. 1967 (1993), the Court held that if the issue of validity was decided by the district court it could be considered on appeal to the Court, and thus requires intervening review by the intermediate Federal Circuit:

The Federal Circuit's determination that the patents were not infringed is subject to review in this Court, and if we reverse that determination, we are not prevented from considering the question of validity merely **[**16]** because a lower court thought it superfluous.

Id. at 97.

In the accompanying opinion this court construes only one claim term, albeit in a manner that negates infringement. However, as the Court teaches in *Cardinal Chemical*, this does not moot the disputed issues of construction of other claim terms, for those issues could be raised on further appeal or in further litigation. In this case the district court relied not only on the "whereby" clause on which this panel relies, [*1333] but also on the construction of other terms in other clauses; and in turn, the inventor Hoffer has presented cogent arguments for modification of the district court's construction of some other terms. The Federal Circuit need not and should not truncate our review when disputed aspects of the district court's claim construction can be relevant to further enforcement of the patent and possible challenges to validity as well as infringement.

On this appeal, Mr. Hoffer argues that the district court's claim construction was incorrect in several ways. Refusal to review the claim construction essentially erases this effort, by the parties and the district court, to establish the scope [*17] of the patent. Our refusal to reach the major portion of the district court's claim construction does not say whether we deem it correct or incorrect. The Court in *Cardinal Chemical* criticized the Federal Circuit's earlier practice of refusing to review the district court's decision on the issue of validity. The Court pointed out that such inaction leaves unresolved, or clouded, important rights affecting the patentee, the alleged infringer, and the public:

Indeed, as Morton's current predicament illustrates, see *supra*, at 1971, the Federal Circuit's practice injures not only the alleged infringer and the public; it also may unfairly deprive the patentee itself of the appellate review that is a component of the one full and fair op-

portunity to have the issue adjudicated correctly.

508 U.S. at 101.

This court neither vacates nor reviews the rest of the construction of Mr. Hoffer's claims. Should there be error by the district court it now rests unreviewed; yet no one can confidently rely on a claim construction which this court does not reach. Neither the patentee nor the public is served by such uncertainty, as the Supreme Court recognized: [*18]

The Federal Circuit's practice denies the patentee such appellate review, prolongs the life of invalid patents, encourages endless litigation (or at least uncertainty) over the validity of outstanding patents, and thereby vitiates the rule announced in *Blonder-Tongue*.

Id. at 102 (citing *Blonder-Tongue Labs., Inc. v. Univ. of Ill. Found.*, 402 U.S. 313, 28 L. Ed. 2d 788, 91 S. Ct. 1434 (1971)).

It is not a tenable excuse that the technology is complicated and appellate review difficult; indeed, these are reasons for resolving the disputed aspects, not reserving them for future redetermination. The Court in *Cardinal Chemical* made clear that when the district court has decided issues that may be relevant to the future of the patent, and those issues are appealed, our obligation is to review the district court's decision. This claim construction has been tried and has been appealed. It is our responsibility to decide the appeal. No sound reason supports the court's departure from this obligation in this case, and the logic of *Cardinal Chemical* prohibits it.

UNION CARBIDE CHEMICALS & PLASTICS TECHNOLOGY
CORPORATION and UNION CARBIDE CORPORATION, Plaintiffs-Cross
Appellants, v. SHELL OIL COMPANY, SHELL CHEMICAL COMPANY, and
CRI CATALYST COMPANY, Defendants-Appellants.

04-1475, -1512

UNITED STATES COURT OF APPEALS FOR THE FEDERAL CIRCUIT

425 F.3d 1366; 2005 U.S. App. LEXIS 21425; 76 U.S.P.Q.2D (BNA) 1705

October 3, 2005, Decided

SUBSEQUENT HISTORY: Rehearing denied by, Rehearing, en banc, denied by *Union Carbide Chems. & Plastics Tech. Corp. v. Shell Oil Co.*, 434 F.3d 1357, 2006 U.S. App. LEXIS 502 (Fed. Cir., Jan. 10, 2006)

PRIOR HISTORY: **[**1]** Appealed from: United States District Court for the District of Delaware. Chief Judge Sue L. Robinson. *Union Carbide Chems. & Plastics Tech. Corp. v. Shell Oil Co.*, 2004 U.S. Dist. LEXIS 10730 (D. Del., June 9, 2004)

DISPOSITION: AFFIRMED-IN-PART, REVERSED-IN-PART, VACATED-IN-PART and REMANDED.

COUNSEL: Harry J. Roper, Jenner & Block LLP, of Chicago, Illinois, argued for plaintiffs-cross appellants. With him on the brief were David R. Bennett, Aaron A. Barlow, and Raymond N. Nimrod; Paul M. Smith and Marc A. Goldman, of Washington, DC. Of counsel on the brief was Bruce M. Kanuch, The Dow Chemical Company, of Midland, Michigan.

William C. Slusser, Slusser Wilson & Partridge LLP, of Houston, Texas, argued for defendants-appellants. With him on the brief were Jayme Partridge and Jayne Piana. Of counsel on the brief were John D. Norris and Richard L. Stanley, Howrey LLP, of Houston, Texas. Of counsel were Laura F. Jones, Keith Jaasma and Michael E. Wilson, Slusser Wilson & Partridge LLP, of Houston, Texas.

JUDGES: Before MAYER, RADER, and PROST, Circuit Judges.

OPINIONBY: RADER

OPINION: **[*1368]** RADER, Circuit Judge.

The United States District Court for the District of Delaware granted final judgment to Union Carbide Chemicals & Plastics Technology Corporation and

Union Carbide Corporation (collectively Union Carbide) after a jury **[**2]** found that Shell Oil Company, Shell Chemical Company, and CRI Catalyst Company (collectively Shell) infringed claim 4 of Union Carbide's U.S. Patent No. 4,916,243 (the '243 patent). *Union Carbide Chems. & Plastics Tech. Corp. v. Shell Oil Co.*, 2004 U.S. Dist. LEXIS 10730, No. Civ. 99-CV-274-SLR, Civ. 99-846-SLR, 2004 WL 1305849 (D. Del. June 9, 2004) (Union Carbide III). Because substantial evidence supports the jury verdict, this court affirms that finding. However, because the district court improperly excluded Shell's exportation of catalysts in its damages calculation, this court vacates the damage award and remands.

I.

In 1999, Shell filed a declaratory judgment action in the United States District Court for the Southern District of Texas alleging that Union Carbide's U.S. Patent No. 5,057,481 (the '481 patent), U.S. Patent No. 4,908,343 (the '343 patent), and the '243 patent were invalid, unenforceable, and not infringed. One month later, Union Carbide sued Shell in the United States District Court for the District of Delaware alleging that six of Shell's catalysts infringed those same patents. *Union Carbide Chems. & Plastics Tech. Corp. v. Shell Oil Co.*, 163 F. Supp. 2d 426, 430 (D. Del. 2001) **[**3]** (Union Carbide I). The two cases were consolidated for trial in Delaware. After a twelve day trial, a jury returned a verdict for Shell on issues of infringement and invalidity. Id. Upon appeal, this court affirmed-in-part, reversed-in-part, and remanded. *Union Carbide Chems. & Plastics Tech. Corp. v. Shell Oil Co.*, 308 F.3d 1167 (Fed. Cir. 2002) (Union Carbide II).

In 2003, the district court held a second jury trial on the remanded issues involving only the '243 patent. *Union Carbide III*, 2004 U.S. Dist. LEXIS 10730, 2004 WL 1305849, at *1. The jury returned a verdict finding that Shell's S-880 and 88 S-2 catalysts directly infringed claim 4 in the production of ethylene oxide (EO). The jury also found that Shell contributorily

infringed claim 4 by selling its S-863, S-880 and S-882 catalysts to third parties. *Id.* Accordingly, the jury awarded \$ 112,198,893 in damages to Union Carbide. The trial court first adjusted that award to \$ 111,212,665 after correcting for a clerical error and later to \$ 153,615,774 for prejudgment interest. 2004 U.S. Dist. LEXIS 10730, [WL] at *1, 2004 U.S. Dist. LEXIS 10730, [WL] *15 n. 19, 2004 U.S. Dist. LEXIS 10730, [WL] *20, 2004 U.S. Dist. LEXIS 10730, [WL] *22. This damages award, however, did not account for Shell's exportation of catalysts because [**4] the district court ruled in limine that 35 U.S.C. § 271(f) damages are not available for process claims, such as claim 4 of the '243 patent. After considering post-trial motions from both parties, the district court entered a final judgment for Union Carbide and a permanent injunction against Shell, which it stayed pending Shell's appeal to this court. 2004 U.S. Dist. LEXIS 10730, [WL] at *22.

Shell appeals the district court's denial of its Judgment as a Matter of Law (JMOL) motions and the damages amount. Union Carbide cross-appeals the district court's holding that 35 U.S.C. § 271(f) does not apply to process claims and the jury verdict finding that Shell's infringement was not willful. This court has jurisdiction under 28 U.S.C. § 1295(a)(1) (2000).

II.

This court described the technology at issue in this case at length in *Union Carbide II*. See *Union Carbide II*, 308 F.3d at 1171-73. The district court also explained the technology very well in *Union Carbide III*. *Union Carbide III*, 2004 U.S. Dist. LEXIS 10730, 2004 WL 1305849, at *2. In brief, the '243 patent claims improved silver catalysts for the commercial production [**5] of EO. *Union Carbide III*, 2004 U.S. Dist. LEXIS 10730, 2004 WL 1305849, at *2. EO gas is used primarily in the industrial production of ethylene glycol, which is used, in turn, to produce [*1370] polyester fiber, resin and film. *Id.* Most of the EO produced each year is converted into monoethyleneglycol (MEG). Union Carbide and its parent corporation, Dow Chemical, produce twenty-five percent of the MEG sold domestically. 2004 U.S. Dist. LEXIS 10730, [WL] at *2 n. 3. Shell is a direct competitor of Union Carbide and Dow Chemical in EO production and MEG sales.

Union Carbide's proprietary process for EO production involves a highly exothermic reaction between ethylene and oxygen occurring between 250 -300o C. '243 patent, col. 12, l. 50-col. 13, l. 30. Before 1971, the ordinary artisan in this field understood that a silver catalyst decreased the reaction temperature and increased reaction efficiency without consuming or altering the silver itself. 2004 U.S. Dist. LEXIS 10730, [WL] at *2. However, no producer managed to increase the reaction efficiency beyond 65 percent. *Id.* In 1971, scientists discovered that certain alkali metals in

small amounts further promoted the efficiency of silver-catalyzed reactions. *Id.* Union Carbide thus undertook [**6] considerable research on catalysts with silver and other alkali metals. This research led to the invention now claimed in the '243 patent.

The '243 patent claims a process for the production of EO with a greater decrease in the reaction temperature than processes using pure silver catalysts. Thus, this new process reduces the formation of oxygen and water byproducts and increases the efficiency of the reaction. '243 patent, col. 8, ll. 39-55. Claim 4, the sole claim at issue in the present appeal, concerns a process involving a catalyst including silver, cesium and lithium. Claim 4 of the '243 patent reads:

4. The process of claim 1 wherein said alkali metal is lithium.

1. In the continuous process for the production of ethylene oxide by the vapor phase oxidation of ethylene with molecular oxygen provided as an oxygen-containing gas at a temperature of from about 200o C. to 300o C. in the presence of at least about one mole percent of carbon dioxide and an organic chloride in the gaseous feed stream and in the presence of a supported, silver-containing catalyst in a fixed bed, tubular reactor used in commercial operations to form ethylene oxide, wherein said supported, [**7] silver-containing catalyst contains 2 to 20 weight percent silver deposited on a support which is in a form and size for use in the reactor, wherein (i) the specific reaction conditions of the ethylene oxide process; (ii) the specific catalyst support characteristics and (iii) the specific silver deposition method comprise an ethylene oxide production system, the improvement in which the catalyst comprises silver deposited on an alpha-alumina macroporous support in a first amount having a surface area less than 10 m² /g and contains a combination of (a) cesium in a second amount and (b) at least one other alkali metal selected from the group consisting of lithium, sodium, potassium and rubidium in a third amount, which combination comprises (a) and (b) in amounts in relation to the amount of silver in the catalyst sufficient to provide an efficiency of ethylene oxide manufacture that is greater than the efficiencies obtainable in the same ethylene oxide production system, including the same conversions, than (i) a second

catalyst containing silver in the first amount and cesium in the second amount, and (ii) a third catalyst containing silver in the first amount and the alkali [**8] metal in the third amount, wherein the combination of silver, cesium and alkali metal in said catalyst is characterizable by an efficiency equation:

[*1371] [SEE ILLUSTRATION IN ORIGINAL]

where BA1 =BRb, BA2 =BK, BA3 =BNa, BA4 =BLi[sic], and where the coefficient b0 through b9j and BG, BRb, BK, BNa, BLi and BCs are determined from a composite design set of experiments using the same ethylene oxide production system for the independent variables silver, cesium and alkali metal, and wherein BG is the difference of the average value of the silver content from the silver content used in the design set, BCs is the difference of the average value of the cesium content from the cesium content used in the design set, BRb is the difference of the average value of the rubidium content from the rubidium content used in the design set, BK is the difference of the average value of the potassium content from the potassium content used in the design set, BNa is the difference of the average value of the sodium content from the sodium content used in the design set and BLi is the difference of the average value of the lithium content from the lithium content used in the design [**9] set.

'243 patent, col. 29, l. 53-col. 30, l. 61. (emphasis added). Claim 4, as construed by the district court, contains four limitations:

(1) an EO process operated at specific reaction conditions; (2) the catalyst used in the EO process comprises silver in a first amount, cesium in a second amount, and lithium in a third amount; (3) the efficiency obtainable from the EO process using the catalyst is greater than the efficiency of a process using (a) a second catalyst containing silver in the first amount and cesium in the sec-

ond amount (but no lithium) and (b) a third catalyst containing silver in the first amount and lithium in the third amount (but no cesium), when operated in the same EO production system (the "comparison test"); and (4) the combination of silver, cesium and lithium is characterizable by the efficiency equation set forth in claim 1 (the "characterizable test").

Union Carbide III, 2004 U.S. Dist. LEXIS 10730, 2004 WL 1305849, at *3.

At trial, Union Carbide provided evidence showing that 58 samples of "Shell" catalysts met the comparison and characterizable limitations of claim 4. Specifically, [*1372] Union Carbide's expert witness, Professor Haller, tested [**10] samples sold by Shell commercially and catalysts that he produced by following recipes detailed in Shell's internal documents. Shell now challenges the sufficiency of this evidence in proving infringement of claim 4. Shell contends that, inter alia: (1) Union Carbide did not conduct its tests of Shell's catalysts at the "same conversions" of ethylene and oxygen to EO gas as specified by the '243 patent; (2) Union Carbide did not vary silver in the desired set of experiments; and (3) Union Carbide did not conduct the "comparison test" in the "same ethylene production system," nor did they conduct the "characterizable test" in the "same ethylene production system," but instead conducted each test in an EO production system different than Shell's. Shell also contends that, if Union Carbide's tests are sufficient to prove infringement, the claims are invalid.

III.

"The grant or denial of a motion for judgment as a matter of law is a procedural issue not unique to patent law, reviewed under the law of the regional circuit in which the appeal from the district court would usually lie." *Summit Tech., Inc. v. Nidek Co.*, 363 F.3d 1219, 1223 (Fed. Cir. 2004). Under the [**11] law of the United States Court of Appeals for the Third Circuit, this court exercises plenary review over an order denying JMOL. *Microvote v. Montgomery County*, 320 F.3d 440, 446 (3d Cir. 2003). The Third Circuit grants motions for JMOL only if, "viewing the evidence in the light most favorable to the nonmovant and giving it the advantage of every fair and reasonable inference, there is insufficient evidence from which a jury reasonably could find liability." *Id.* (citing *Lightning Lube, Inc. v. Witco Corp.*, 4 F.3d 1153, 1166 (3d Cir. 1993)).

While claim construction is a question of law, see *Cybor Corp. v. FAS Techs. Inc.*, 138 F.3d 1448, 1451 (Fed. Cir. 1998) (en banc), infringement, whether literal or under the doctrine of equivalents, is a question

of fact which this court reviews for substantial evidence, see *Bai v. L & L Wings, Inc.*, 160 F.3d 1350, 1353 (Fed. Cir. 1998); *Optical Disc. Corp. v. Del Mar Avionics*, 208 F.3d 1324, 1333-34 (Fed. Cir. 2000).

A finding of willful infringement may qualify a case as exceptional under 35 U.S.C. § 285 (1952), thereby allowing [**12] a party to obtain enhanced damages. "This court reviews a district court's exceptional case finding for clear error." *Imonex Servs., Inc. v. W.H. Munzprufer Dietmar Trenner GmbH, LLC*, 408 F.3d 1374, 1378 (Fed. Cir. 2005) (citing *Pharmacia & Upjohn Co. v. Mylan Pharms., Inc.*, 182 F.3d 1356, 1359 (Fed. Cir. 1999)). The trial judge has discretion to increase damages for exceptional cases; hence, a district court's refusal to award increased damages will not be overturned absent an abuse of that discretion. *Modine Mfg. Co. v. Allen Group, Inc.*, 917 F.2d 538, 543 (Fed. Cir. 1990).

In reviewing a district court's damages award, "the amount of a prevailing party's damages is a finding of fact on which the plaintiff bears the burden of proof by a preponderance of the evidence. . . . However, certain subsidiary decisions underlying a damage theory are discretionary with the court, such as, the choice of an accounting method of determining profit margin . . . or the methodology for arriving at a reasonable royalty." [**1373] *SmithKline Diagnostics, Inc. v. Helena Lab. Corp.*, 926 F.2d 1161, 1164 (Fed. Cir. 1991). "A jury's decision with [**13] respect to an award of damages 'must be upheld unless the amount is 'grossly excessive or monstrous', clearly not supported by the evidence, or based only on speculation or guesswork.'" *State Contracting & Eng'g Corp. v. Condotte Am., Inc.*, 346 F.3d 1057, 1072 (Fed. Cir. 2003) (quoting *Brooktree Corp. v. Advanced Micro Devices, Inc.*, 977 F.2d 1555, 1580 (Fed. Cir. 1992)). Finally, "this court reviews questions of statutory interpretation without deference." *U.S. Steel Group v. United States*, 225 F.3d 1284, 1286 (Fed. Cir. 2000).

IV.

Shell challenges the sufficiency of the evidence supporting the jury verdict that Shell directly and contributorily infringes claim 4 of the '243 patent. *Union Carbide III*, 2004 U.S. Dist. LEXIS 10730, 2004 WL 1305849, at *1. Shell initially challenged the sufficiency of the evidence below in a motion for JMOL or, in the alternative, for a new trial, after the jury returned its verdict against Shell. 2004 U.S. Dist. LEXIS 10730, [WL] at *5. The district court denied Shell's motion.

As a threshold matter, this court must decide whether Shell waived this issue by failing to timely object to the district court's jury instruction under [**14] Fed. R. Civ. P. 51. Union Carbide contends that Shell only objected after close of evidence and completion of the jury instruction charge conference. Because Union Carbide construes Shell's non-infringement arguments as claim construction issues,

Union Carbide considers Shell to have waived these arguments. Union Carbide cites instances that this court has found waiver of claim construction issues. See *Eli Lilly & Co. v. Aradigm Corp.*, 376 F.3d 1352, 1360 (Fed. Cir. 2004); *Hewlett-Packard Co. v. Mustek Sys., Inc.*, 340 F.3d 1314, 1321 (Fed. Cir. 2003).

Although often difficult to distinguish claim construction and infringement, this court's case law requires the distinction. See *Beckson Marine, Inc. v. NFM, Inc.*, 292 F.3d 718, 724 (Fed. Cir. 2002) (commenting that "after claim construction, the infringement inquiry shifts to a comparison of the claim with the allegedly infringing device.") (citing *Kemco Sales, Inc. v. Control Papers Co.*, 208 F.3d 1352, 1359, 54 USPQ2d 1308, 1312 (Fed. Cir. 2000) (emphasis added)); *KCJ Corp. v. Kinetic Concepts, Inc.*, 223 F.3d 1351, 1358 (Fed. Cir. 2000) [**15] ("Literal infringement of a claim occurs when every limitation recited in the claim appears in the accused device, i.e., when 'the properly construed claim reads on the accused device'" exactly.) (quoting *Amhil Enters., Ltd. v. Wawa, Inc.*, 81 F.3d 1554, 1562 (Fed. Cir. 1996) (emphasis added)); *Markman v. Westview Instruments, Inc.*, 517 U.S. 370, 134 L. Ed. 2d 577, 116 S. Ct. 1384 (1996) (holding that construing patent claims is a question of law for the judge, separate from determining whether infringement occurred which is a question of fact to be submitted to the jury). Contrary to Union Carbide's assertions, this court construes Shell's arguments as most relevant to non-infringement, rather than claim construction. Shell, in essence, challenges the sufficiency of the evidence supporting a finding of infringement. Nonetheless, in at least one of Shell's challenges to the infringement verdict, its argument questions the meaning of words in the district court's jury instructions. Therefore, even with respect to this infringement issue (as opposed to claim construction issues), this court assesses the timeliness of Shell's objections under Rule 51.

[**1374] Rule 51 is [**16] not unique to patent cases and, thus, regional circuit law applies. *Ecolab Inc. v. Paraclipse, Inc.*, 285 F.3d 1362, 1369 (Fed. Cir. 2002). Under Third Circuit law, a party need only lodge a sufficiently specific objection before jury deliberations to preserve issues for appeal. See *Alexander v. Riga*, 208 F.3d 419, 426 (3d Cir. 2000); *Waldorf v. Shuta*, 896 F.2d 723, 739-40 (3d Cir. 1990).

The record shows that Shell requested clarifying instructions on the three claim terms at issue on Monday morning, November 3, 2003, before the judge's delivery of instructions to the jury. During a conference between counsel from both parties and the judge out of the jury's presence, Mr. Norris, counsel for Shell, informed the district court that he "would like to just read these [issues] in to the record for purposes of preserving issues for appeal." After the district court allowed Mr. Norris to make his record, he objected to

the jury instructions by requesting insertion of the following language:

[1] Because the '243 *patent* defines conversion as ethylene conversion, the efficiency must be determined at the same ethylene conversion [**17] achieved in the accused commercial ethylene oxide production system.

....

[2] Once the commercial ethylene oxide production system is defined, thereby fixing the specific reaction conditions, the specific catalyst support characteristics and the specific silver deposition method to precise values, that same ethylene oxide production system must be duplicated in its entirety by the laboratory or experimental conditions and parameters.

....

[3] In Claim 4, the limitation, quote, independent variable silver cesium and alkali metal, close quote, requires testing and a design set of experiments where the concentrations of silver, cesium and lithium are varied across a range of values.

(Alterations added.) Thereafter, the district court acknowledged Shell's arguments.

Jury deliberations occurred after the judge gave instructions to the jury and a verdict was reached on the same day. Because Shell sufficiently raised specific objections before jury deliberations, Shell did not waive its objections to the sufficiency of the evidence on appeal.

V.

Shell asserts that Union Carbide did not show that any of Shell's catalysts provide an efficiency of EO [**18] manufacture that is greater than the efficiencies obtainable using (a) a second catalyst containing silver and cesium (but no lithium) and (b) a third catalyst containing silver and lithium (but no cesium), in the same ethylene oxide production system. Specifically, Shell notes that the "comparison test" in the claims specifically calls for the efficiency comparison using the same ethylene oxide production system, including the same conversions. Shell contends "conversion" equates to "ethylene conversion" and thus incorporates

a specific formula for ethylene conversion from *U.S. Patent No. 3,420,784* (the '784 patent):

[SEE ILLUSTRATION IN ORIGINAL]

'784 patent, col. 3, ll. 25-27. Because Union Carbide's expert witness did not use [**1375] this formula in his tests, Shell asserts that this testing does not prove infringement of the comparison limitation of the claims. However, Shell's argument mischaracterizes the '243 *patent's* disclosure of acceptable techniques for comparing catalyst efficiencies.

The '243 specification teaches that one "convenient measure of activity, i.e., the degree of conversion of reactant to product per unit time, is the temperature required to obtain [**19] either a fixed ethylene oxide production or to achieve a chosen level of mole percent ethylene (or oxygen) conversion." '243 patent, col. 11, ll. 16-22 (emphasis added). Thus, Union Carbide's expert, Professor Haller, applied a test expressly approved by the patent specification. Professor Haller determined catalyst efficiency by monitoring the temperature required to obtain a fixed 1% EO output (a higher temperature for a given output indicates a lower efficiency). This measure for catalyst efficiency yielded results placing Shell's catalysts squarely within this claim limitation. The trial format gave Shell the opportunity to challenge the accuracy of Professor Haller's results by conducting other tests or by cross-examining Professor Haller. In any event, as an evidentiary matter, Professor Haller's tests followed the directions of the patent specification. The record thus contains sufficient evidence to support the jury verdict of infringement of the comparison limitation.

VI.

Shell asserts that the record does not show that Shell's catalysts are characterizable by the efficiency equation set forth in claim 1, i.e., the "characterizable test." Shell argues that the "characterizable [**20] test" requires variation of each independent variable—silver, cesium and lithium—in the same ethylene oxide production system. Because Union Carbide's expert witness did not vary silver in his experiments, Shell asserts that his testing cannot show infringement. These arguments, however, overlook both the permissive meaning of the term "variable" and this court's construction of the efficiency equation in *Union Carbide II*.

The claim language does not require variation of all three of the components. The claim uses the language "independent variables, silver, cesium, and alkali metal." The word "independent" means that each variable is free to operate without regard to the others. In other words, the concentration of the silver component can be set at and maintained at any value, including zero. Thus, the claims permit the variation of the silver component, but do not mandate silver variation. Indeed, the specification makes this explicit: "The

value of some of the coefficients of the equation may be zero" when deriving the "synergistic binary alkali metal combinations of the invention." '243 patent, col. 8, l. 56-col. 9, ll. 23-4.

Furthermore, this court in *Union Carbide* [**21] II clarified that "characterizable by an efficiency equation" in claim 1 "covers those catalysts that are described by the efficiency equation" or "capable of being described by an efficiency equation." *Union Carbide II*, 308 F.3d at 1178-79. In other words, the "characterizable test" is a "descriptive tool that defines the scope of the invention." *Id.* at 1178. The invention's improvement over the prior art is the addition of new synergistic concentrations of alkali metals to known concentrations of silver. This claim captures this aspect of the invention in the "characterizable [*1376] test." This important test, however, does not require variation of what was already known (i.e., silver) in prior art catalysts or an accused catalyst. *Union Carbide II*'s construction requires tests that vary at least the concentrations of the alkali metals of cesium and lithium. Professor Haller's experiments made these variations. Thus, the record contains evidence sufficient to meet the standards of the "characterizable test."

In a related argument, Shell asserts that, if Professor Haller's test conditions and procedures do satisfy the "characterizable by an [**22] efficiency equation" limitation, then the '243 patent is anticipated under 35 U.S.C. § 102(b) by U.S. Patent No. 4,212,772 (the '772 patent). Notably, however, the '772 patent does not disclose use of lithium-based catalysts in the claimed continuous process for the production of EO with carbon-dioxide in the feed. In addition, the admitted expert reports suggest that the '772 patent's catalyst does not meet the characterizable test as construed by the court. Thus, the '772 patent does not clearly anticipate claim 4 as argued by Shell. See *Celeritas Techs. v. Rockwell Int'l Corp.*, 150 F.3d 1354, 1361 (Fed. Cir. 1998) ("[A] claim is anticipated if each and every limitation is found either expressly or inherently in a single prior art reference.").

VII.

In its final non-infringement argument, Shell asserts that *Union Carbide* did not test Shell's catalysts in the same ethylene production system as used by Shell, thus lacking evidence of infringement of this claim limitation. Rather, Professor Haller conducted his tests in one EO production system that was representative of all of Shell's 69 accused processes (i.e., an approximation [**23] of the entire set of processes that does not match any one particular Shell process). Shell argues this "representative" testing is inadequate because representative testing was disclaimed during prosecution and does not "define" Shell's system as required by the district court's jury instructions.

This argument springs from the way Shell construes the term "define" in the district court's jury instruction. The relevant jury instruction reads:

"The same ethylene oxide production system." The file wrapper and patent describe an experimental procedure whereby, once "the conditions and parameters" for a particular ethylene oxide production system are defined, a composite design set of experiments are carried out from which the synergistic combinations are determinable. . . . Therefore, the phrase "same ethylene oxide production system" is construed to mean the laboratory or experimental "conditions and parameters" which define the ethylene oxide production system which ultimately will be used commercially.

(Emphasis added.)

Shell advances the position that "define" means that the laboratory conditions must match the parameters for each of the 69 accused commercial [**24] processes. In other words, *Union Carbide* must conduct 69 tests, each test matching the parameters in a corresponding accused process. However, the claim language does not specify any particular form of testing - either that contemplated by Shell or the representative testing conducted by Professor Haller. The district court instead explicitly noted [*1377] that the claims did not require a test matching each of Shell's commercial processes. *Union Carbide III*, 2004 U.S. Dist. LEXIS 10730, 2004 WL 1305849, at *6 (holding the claims "do not require that the specific reaction conditions of each commercial process be tested, only that the laboratory conditions and parameters define the process ultimately used.") (emphasis added). Because the claim does not require an exact match to the accused processes, *Union Carbide* had only an obligation to show that its test parameters sufficiently covered the range of conditions in each of the 69 accused commercial processes. As explained by Professor Haller, his tests did precisely that:

We, obviously, can [not] test every batch of Shell catalyst that was ever made, so I wanted to test it under conditions that would define the whole range of commercial conditions. [**25] Not all of them, a specific, particular set that represented commercial conditions and would be applicable. That is, the relative testing, not the absolute, the relative testing would be applicable.

Even Shell uses a single representative set of experimental conditions to test their commercial catalysts' efficiencies and warrant these catalysts based on those laboratory tests, *not* based on individual tests for each of their 69 processes.

Because the claim language does not require a particular form of testing, this inquiry is not a claim construction question, which this court reviews *de novo*. Rather, this court reviews this inquiry as a question of fact. Does the record contain adequate evidence to support the jury's verdict that Professor Haller's laboratory or experimental conditions and parameters did, in fact, define the system ultimately used by Shell? *Bai*, 160 F.3d 1353. Because Professor Haller's testimony supports the conclusion that his tests represented each commercial system, substantial evidence supports the jury's determination of infringement.

VIII.

On the question of the royalty computation, the district court admitted evidence regarding [**26] the impact of Shell's infringing sales on Union Carbide Chemicals, the parent of a holding company that holds the title to the '243 patent. Union Carbide Corporation is the parent corporation of the '243 patent's sole assignee, Union Carbide Chemicals & Plastics Technology Corporation, a technology holding company that does not make, use or sell EO. Therefore, Shell asserts that Union Carbide Corporation is merely a non-exclusive licensee of the '243 patent that "suffers no legal injury from infringement." *Ortho Pharm. Corp. v. Genetics Institute, Inc.*, 52 F.3d 1026, 1031 (Fed. Cir. 1999). Based on this assertion, Shell fears that evidence about the impact of Shell's infringing sales on Union Carbide Chemicals effectively allowed the holding company to seek damages for Union Carbide Chemicals' lost profit.

To the contrary, unlike the entities in *Ortho Pharm.*, Union Carbide Corporation is not merely a non-exclusive licensee of the '243 patent. In *Ortho Pharm.*, the non-exclusive licensee was a pharmaceutical company given rights to sell a drug bio-engineered by another pharmaceutical company. *Id.* at 1028-30. The licensing transaction in that [**27] case was conducted at arm's length and involved no ownership relationship between the two companies. *Id.* In the present case, however, Union Carbide Corporation wholly owns Union Carbide Chemicals & Plastics Technology [**1378] Corporation. Their relationship thus goes far beyond a licensor/licensee arrangement. Hence, *Ortho's* holding does not apply in this setting where different business realities stem from the partnership of these related entities.

Because of the genuine relationship between these companies, the district court decision properly permitted consideration of these sales. Simply put, the hold-

ing company would not enter any negotiation without considering the competitive position of its corporate parent, Union Carbide Corporation. Shell is a direct competitor of Union Carbide Corporation in EO production and MEG sales. Therefore any hypothetical negotiation with the holding company must necessarily include the reality that the economic impact on the Union Carbide Corporation would weigh heavily in all decisions. The district court correctly recognized that the hypothetical negotiation model would thus properly include these circumstances. Consequently, the district court [**28] did not abuse its discretion in admitting this evidence for purposes of calculating a reasonable royalty.

In addition, the district court properly permitted the jury to consider damages evidence about Shell's profits for MEG production. In this technology, increased EO production directly increases MEG production. With this linkage, this court perceives no error in permitting the jury to factor evidence of bundling and convoyed sales into a determination of the scope of the royalty base. *Deere & Co. v. Int'l Harvester Co.*, 710 F.2d 1551, 1559 (Fed. Cir. 1983) (authorizing such an approach as "eminently reasonable"). In fact, the district court found that the most common and profitable form of EO is MEG. *Union Carbide III*, 2004 U.S. Dist. LEXIS 10730, 2004 WL 1305849, at *5 n.3. Thus, the district court did not abuse its discretion in admitting evidence of convoyed MEG sales for calculating a reasonable royalty. Accordingly this court affirms the district court's damages award. IX.

On the cross appeal, Union Carbide asserts that the district court erred as a matter of law by ruling in limine that 35 U.S.C. § 271(f) "is not directed to process claims. [**29] " In doing so, the court prohibited Union Carbide from submitting evidence of Shell's foreign sales for the purpose of recovering additional damages under 35 U.S.C. § 271(f)(2). This prohibition was in error.

Section 271(f) of title 35 is generally directed at the exportation, from the United States, of components of patented inventions. Specifically, § 271(f)(2) states:

(2) Whoever without authority supplies or causes to be supplied in or from the United States any component of a patented invention that is especially made or especially adapted for use in the invention and not a staple article or commodity of commerce suitable for substantial non-infringing use, where such component is uncombined in whole or in part, knowing that such component is so made or adapted and intending that such component will be combined outside of the United States in a manner that would infringe the patent if such

combination occurred within the United States, shall be liable as an infringer.

35 U.S.C. § 271(f)(2) (2000) (emphasis added). This case again questions the meaning of the phrase "any component of a patented invention" in the [**30] statute. In other words, does this phrase apply to components used in the performance of patented [**1379] process/method inventions? *Eolas Techs. v. Microsoft Corp.*, 399 F.3d 1325, 1339 (Fed. Cir. 2005) recently answered this question in the affirmative, holding that every component of every form of invention deserves the protection of 35 U.S.C. § 271(f); i.e., that "components" and "patented inventions" under § 271(f) are not limited to physical machines. In *Eolas*, this court stated:

Section 271(f) refers to "components of a patented invention." This statutory language uses the broad and inclusive term "patented invention." Title 35, in the definitions section, defines "invention" to mean "invention or discovery" - again broad and inclusive terminology. 35 U.S.C. § 100(a) (2000). The next section in Title 35, section 101, explains that an invention includes "any new and useful process, machine, manufacture or composition of matter."

Id. at 1338-39. Thus, as *Eolas* explained, the statute makes no distinction between patentable method/process inventions and other forms of patentable [**31] inventions.

Moreover, *Eolas* and this case featured similar facts. In *Eolas*, Microsoft exported a master computer disc with program code that caused a computer to perform various method steps. See *U.S. Patent No. 5,838,906*, col. 17, ll. 58-col. 18, ll. 30. Thus, both this case and *Eolas* feature the exportation of a component (i.e., a computer disc with program code in *Eolas* and a catalyst in this case) used in the performance of a patented process or method (i.e., the method steps executed by the computer in response to the computer readable program code in *Eolas* and the commercial production of EO in this case). In that setting, *Eolas* applied § 271(f) to Microsoft's exported component. Similarly, § 271(f) applies to Shell's exportation of catalysts (i.e., a "component") used in the commercial production of EO abroad (i.e., a "patented invention").

This court has recently interpreted § 271 in two other cases. See *AT&T Corp. v. Microsoft Corp.*, 414 F.3d 1366 (Fed. Cir. 2005); *NTP, Inc. v. Research In Motion, Ltd.*, 418 F.3d 1282, 418 F.3d 1282, 2005 U.S. App. LEXIS 15920 (Fed. Cir. 2005). Because AT&T concluded that § 271(f) applied to [**32] the exporta-

tion of components ultimately used abroad, its reasoning supports application of § 271 to the facts of this case. See *AT&T*, 414 F.3d at 1368 (applying § 271(f) to the exportation of a "master" computer readable disc that was further copied abroad, with the copies installed as software on assembled computers). This case, however, presents an even stronger basis for applying § 271(f) because Shell supplies all of its catalysts from the United States directly to foreign affiliates. Shell's foreign affiliates do not copy these catalysts and use the copies in a foreign process, but instead use the catalysts supplied by Shell directly in their processes.

Unlike AT&T, NTP did not find that § 271(f) applied. However, NTP involved facts that differ in important respects from the facts in this case. Specifically, NTP involved the sale of wireless handheld devices and supporting software for a wireless email network. *NTP*, 418 F.3d at 1289-90, 2005 U.S. App. LEXIS 15920. Research In Motion (RIM) sold wireless handheld devices in the United States. When the owners of those devices traveled abroad, those devices were used outside of the United States; otherwise, [**33] those devices were used in the United States. This court in NTP considered whether use of these domestic devices with a system partially operating abroad constituted infringement under § 271(f). *Id.* The NTP court answered this question in the negative:

[**1380] While it is difficult to conceive of how one might supply or cause to be supplied all or a substantial portion of the steps of a patented method in the sense contemplated by the phrase "components of a patented invention" in section 271(f), it is clear that RIM's supply of the BlackBerry handheld devices and Redirector products to its customers in the United States is not the statutory "supply" of any "component" steps for combination into NTP's patented methods.

Id. at 1322, 2005 U.S. App. LEXIS 15920. Under the facts of NTP, this court declined to apply § 271(f) when RIM itself did not supply any component to a foreign affiliate. This court in NTP also affirmed a finding of infringement under § 271(a) for RIM's domestic sales of devices (BlackBerries) used in the process. *Id. at 1316-17*, 2005 U.S. App. LEXIS 15920. Thus, this court in NTP declined to authorize additional damages for NTP under § 271(f).

NTP [**34] is different from this case because Shell supplies catalysts from the United States directly to foreign customers. Because Shell supplies these catalysts directly to its foreign affiliates, this court does

not face another situation involving the domestic sale of a component being used, in part, outside the United States. Shell's domestic sales are separately covered by the district court's present damages calculation. As such, *Eolas*, a case more factually analogous and earlier in time than NTP, governs this case.

In brief, because § 271(f) governs method/process inventions, Shell's exportation of catalysts may result in liability under § 271(f). Accordingly, the district court abused its discretion in excluding Shell's exportation of catalysts as part of its damages award. This court remands this case to the district court for additional findings on Shell's potential liability under 35 U.S.C. § 271(f).

X.

The cross appeal also questions the district court's denial of Union Carbide's motion for JMOL that Shell willfully infringed the '243 patent. Specifically, Union Carbide contends that Shell became aware of the '243 patent shortly after issuance, [**35] but continued to produce EO in an infringing process without ever obtaining a formal opinion of counsel. Thus, according to Union Carbide, the undisputed facts demonstrate Shell willfully infringed the '243 patent. This argument overstates the facts in the record before the district court.

This court has already declined to draw a negative inference from a party's failure to obtain a formal opinion of counsel after it becomes aware of an issued patent. See *Imonex Servs. v. W.H. Munzprufer Dietmar Trenner GmbH*, 408 F.3d 1374, 1378 (Fed. Cir. 2005) (citing *Knorr-Bremse Systeme Fuer Nutzfahrzeuge GmbH v. Dana Corp.*, 383 F.3d 1337, 1342 (Fed. Cir. 2004) (en banc)). Thus, Shell's decision to proceed without an opinion of counsel does not affect the jury verdict in this case.

Moreover, the record shows that Shell was reasonable in its response to the '243 patent. Shell first became aware of the '243 patent when Dr. Clendenen, an in-house patent attorney, discovered the patent as part of a routine monitoring of recently issued patents in the EO catalyst field. The record shows that Dr. Clendenen, a Ph. D. chemical engineer and licensed patent attorney, [**36] interpreted the claims as requiring a specific efficiency equation for development of the catalyst in the claimed process. Because Shell did not make catalysts with this specific efficiency equation, Dr. Clendenen concluded [**1381] that Shell had no reason to fear infringement. The district court at first adopted Dr. Clendenen's reading of the patent which was later rejected by this court. Nonetheless this record suggests that Dr. Clendenen's analysis was not entirely implausible. Accordingly, Shell did not engage in the kind of egregious and reckless conduct that warrants a willfulness finding. *Imonex Servs.*, 408 F.3d at 1377 ("Willfulness requires a showing that the totality of the circumstances evince the egregious conduct that constitutes willful infringement.") (citations omitted). In sum, substantial evidence supports the jury verdict.

XI.

In conclusion, because substantial evidence supports the jury verdicts of infringement and no willfulness, this court affirms those verdicts. However, because the district court erred in concluding § 271(f) does not apply to process claims, this court finds it abused its discretion in excluding Shell's exported catalysts as part [**37] of its damages calculation. The case is remanded to the district court for a new determination of damages.

COSTS

Each party shall bear its own costs.

AFFIRMED-IN-PART, REVERSED-IN-PART,
VACATED-IN-PART and REMANDED